Triglops dorothy, a new species of sculpin (Teleostei: Scorpaeniformes: Cottidae) from the southern Sea of Okhotsk

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Abstract—A new species of the cottid genus *Triglops* Reinhardt is described on the basis of 21 specimens collected in Aniva Bay, southern Sakhalin Island, Russia, and off Kitami, on the northern coast of Hokkaido, Japan, at depths of 73–117 m. Of the ten species of *Triglops* now recognized, the new species, *Triglops dorothy*, is most similar to *T. pingeli* Reinhardt, well known from the North Atlantic and North Pacific oceans and throughout coastal waters of the Arctic. The new species differs from *T. pingeli* in a combination of morphometric and meristic characters that includes most importantly the number of dorsolateral scales; the number of oblique, scaled dermal folds below the lateral line; and the number of gill rakers.

Manuscript submitted 28 March 2005 to the Scientific Editor.

Manuscript approved for publication 16 August by the Scientific Editor.

Fish. Bull. 104:238–246 (2006).

Sculpins of the teleost family Cottidae are nearly ubiquitous in cold-water benthic habitats of the Northern Hemisphere, comprising nearly 200 species in the North Pacific alone (Yabe and Nakabo, 1984; Sheiko and Federov, 2000; Mecklenburg et al., 2002; Love et al., 2005), where they are found in almost every benthic habitat from the intertidal to the upper continental slope. Many species are preyed upon by larger fishes and marine mammals (Browne et al., 2002), and are themselves predators primarily of smaller fishes and crustaceans (e.g., Tokranov, 1998; Hoff, 2000; Tokranov and Orlov, 2001). Although many members of the family are also commonly found in bycatch of commercial fisheries (Stevenson, 2004; Orlov, 2005), the systematics and life histories of most species are poorly known (Nelson, 1994; Hoff, 2000; Hoff, 2006) and new species continue to be described (e.g., Yabe, 1995; Yabe and Maruyama, 2001; Yabe et al., 2001). A more complete understanding of the diversity of the family is necessary to understand the role of cottids in the dynamics of North Pacific ecosystems.

The cottid genus *Triglops* Reinhardt (1830), including *Prionistius* Bean (1884), *Elanura* Gilbert (1896), and *Sternias* Jordan and Evermann (1898) as junior synonyms, contains 19 nominal species and subspecies, of which nine are currently recognized as valid (Pietsch, 1993). Members of the genus are characterized most strikingly by having a small head, a narrow, elongate body and a slender caudal peduncle, a long anal fin containing 18–32 rays, pelvic fins with a single spine and three soft rays, branchiostegal membranes united on the ventral midline but lying free from the isthmus, and scales below the lateral line modified to form discrete rows of tiny serrated plates that lie in close-set, oblique dermal folds. The species are generally distributed in rather deep water (primarily between 18 and 600 m, but specimens have been taken more or less on the surface and as deep as 930 m; Andriashev, 1949; Hart, 1973; Fedorov, 1986) throughout cold-water, continental shelf or slope regions of the North Pacific, North Atlantic, and Arctic oceans. All appear to feed primarily on small planktonic and benthic invertebrates (Andriashev, 1949; Fedorov, 1986). Spawning takes place from late summer to winter; the eggs are demersal (Andriashev, 1949; Musick and Able, 1969; Fedorov, 1986).

Triglops was first proposed by Johannes Reinhardt (1830), based on a single specimen from West Greenland, but the type species *T. pingeli* was not named until 1837, after Reinhardt received two additional specimens, also from West Greenland. During the next 130 years, 18 additional species or subspecies were described, but little work of a comparative nature was done. Schmidt (1930) reviewed some North Pacific specimens of the group, and later (Schmidt, 1950) discussed species identified in his work on the ichthyofauna of the Sea of Okhotsk. Taranets (1941) placed the genus, together with *Sternias*, in its own subfamily. The Arctic and North Pacific species of *Triglops* were studied by Jensen (1944), Andriashev (1949, 1954), and McAllister (1963), and a world-wide revision of the genus was subsequently published by Pietsch (1993).

Within the material of *Triglops* examined by Pietsch (1993) are 19 specimens that were originally recognized by Charles Henry Gilbert as new to science (see "Discussion" below). Labeled as such, but left unpublished by Gilbert, Pietsch (1993) came to the same conclusion, citing a lack of agreement of these specimens with the diagnosis of any of the nine recognized species of the genus. However, still not totally convinced that the specimens represented a new species, Pietsch (1993) again postponed a formal description. Labeled *Triglops* sp. and set aside at that time, these specimens are now re-examined in light of the discovery of two additional specimens, and evidence is provided to formally recognize the material as a new species.

Methods and materials

Standard length (SL) is used throughout unless indicated otherwise. Measurements are expressed in percent of standard length or in percent of head length (HL). Methods used for taking counts and measurements follow those described and figured by Miller and Lea (1972:7–12), with the following additions: interorbital width is measured between lateral margins of the frontal bones at their narrowest widths; head depth is measured at mid-orbit; first infraorbital pore width is measured at the greatest width, anterior to posterior; all gill-raker counts are taken from the first arch; dorsolateral scale-row counts include all scales (or fused clusters of scales) with enlarged plate-like bases; lateral-line scale counts also include scales that occasionally extend beyond the posterior margin of the hypural plate. Pectoral-fin rays are counted from dorsal to ventral. Counting the oblique dermal folds on the ventral half of the trunk presents a special problem. Because many dermal folds (the number depending on the species), which originate along the lateral line, terminate irregularly before reaching the ventral midline, counts can be considerably higher and more highly variable (than the values reported in the present study) if made along a transect close to the lateral line; thus, it is important to count the dermal folds along a transect beginning beneath the pectoral fin and continuing along, close to and strictly parallel with, the base of the anal fin (see Pietsch, 1993:337, Fig. 1). Dermal folds of the breast are counted along the ventral mid-line. Symbolic codes for institutions are those provided by Leviton et al. (1985).

Statistical significance was assessed by ANOVA; all differences at $P<0.05$ were considered significant. To aid in the discrimination of the new species and its closest ally, *T. pingeli*, a standard principal component analysis (PCA) was conducted on meristic characters, and a sheared PCA was conducted on morphometric characters for a size-free analysis. The analyses were conducted on the correlation matrix of raw meristic data and the covariance matrix of log-transformed raw morphometric data. Differences between species were illustrated by plotting principal component (PC) 1 against PC2 of the meristic analysis, sheared PC2 against sheared PC3 of the morphometric analysis, and sheared morphometric PC2 against the standard meristic PC1.

Following the PCA, a linear discriminant function analysis (DFA) was conducted on morphometric and meristic data to establish the relative significance of those characters in distinguishing the species. Morphometric data were standardized by dividing by standard length. Each character was tested to verify assumptions of multivariate normality and for statistical significance; those found to be distributed nonnormally or that were nonsignificant were eliminated from further analysis. The robustness of the DFA was tested by conducting a leave-one-out cross-validation procedure. Statistical analyses were performed with S-Plus (vers. 6.1 for Windows, 2002, Insightful, Inc., Seattle, WA) and SPSS (vers. 11.5.1 for Windows, 2002, SPSS Inc., Chicago, IL).

Systematics

Triglops dorothy Pietsch and Orr, n. sp.

Dorothy's sculpin

Figures 1–4, Tables 1–3

Triglops sp.: Pietsch, 1993:379 (probably an undescribed species, description postponed).

Holotype

USNM (U.S. National Museum of Natural History, Washington, D.C.) 74578, female, 155 mm, *Albatross* Station 5013, Aniva Bay, 46°17′N, 143°09′E, 3-m Agassiz trawl, 77 m, substrata unknown, 25 September 1906.

Paratypes

Twenty specimens, 15 males (72.5–148.0 mm), 5 females (68.5–143.0 mm). The following material was collected by the U. S. Fish Commission Steamer *Albatross* in or adjacent to Aniva Bay, Sakhalin Island, Russia, with a 3-m Agassiz trawl: CAS-SU 22305, 3 females (68.5–133.0 mm), station 5007, 46°03′N, 142°31′E, 77 m, green mud, fine gray sand, 24 September 1906. USNM 74575, 2 males (72.5–80.0 mm), station 5006, 46°04′N, 142°29′E, 79 m, green mud, fine gray sand, 24 September 1906;

Figure 1
Triglops dorothy n. sp., holotype, female, 155 mm, USNM 74578.

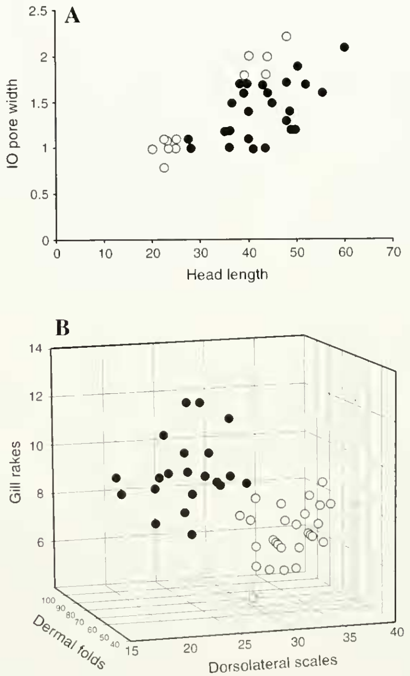

Figure 2
Plots of significant characters differentiating *Triglops dorothy* n. sp. (○) from *Triglops pingeli* (●) in the Sea of Okhotsk: (**A**) width of first infraorbital (IO) pore versus head length; (**B**) Counts of gill rakers versus dermal folds versus dorsolateral scales.

USNM 74576, 3 males (73.0–77.5 mm), 1 female (83.0 mm), station 5008, 46°07′50″N, 142°37′20″E, 73 m, green mud, fine gray sand, 24 September 1906; USNM 74577, female (143.0 mm), station 5016, 46°44′30″N, 143°45′E, 117 m, brown mud, fine black sand, rock, clay, 25 September 1906; USNM 74579, 8 males (73.5–80.0 mm), station 5005, 46°04′40″N, 142°27′30″E, 77 m, green mud, fine gray sand, 24 September 1906. The following material was collected from off Kitami, Hokkaido, Japan, September 1964: HUMZ 41524, 1 male (132.0 mm); HUMZ 41525, 1 male (148.0 mm).

Diagnosis

A species of *Triglops* distinguished from all other described members of the genus in having the following combination of character states: interorbital width 8.9–11.5% HL; caudal fin truncate to slightly rounded; dorsolateral scales well developed, 18–31; lateral-line scales 47–50; transverse dermal folds of breast 4–10; oblique dermal folds 67–99; dorsal-fin rays 23–25; pectoral-fin rays 17–19; gill rakers 7–12; first infraorbital pore length 3.6–5.0% HL; peritoneum everywhere unpigmented or at most with few, widely spaced melanophores.

Description

Body relatively compressed, tapering gradually posteriorly (Fig. 1); head compressed, length 28.4–32.3% SL (Table 1), depth 11.3–13.5% SL; snout pointed, upper profile linear to slightly convex, length 27.4–36.3% HL, about equal to length of orbit; length of orbit 29.0–32.0% HL; upper jaw extending anteriorly slightly beyond lower; first infraorbital pore large, length 3.6–5.0% HL (Fig. 2A); gill rakers 7–12 (Table 2), 0–1 on upper part of arch, 6–11 on lower part of arch, short and blunt; longest pectoral-fin ray 20.9–25.0% SL (sexually dimorphic; see below); third pelvic-fin ray 12.6–17.7% SL, longer than first and second; length of pelvic fin sexually dimorphic (see below); caudal peduncle compressed or roughly circular in cross section, length 14.7–18.3% SL, depth 3.1–4.1% SL. Skin covering elements of upper and lower

Table 1

Proportional morphometrics and meristics of *Triglops dorothy* n. sp. and of *T. pingeli* from the Sea of Okhotsk. Morphometric data are presented in percent of standard length (in mm). Statistical significance was tested by ANOVA when appropriate; ns = not significant.

	Triglops dorothy				*Triglops pingeli*			
	Holotype	*n*	Range	Mean ±SD	*n*	Range	Mean ±SD	Significance
Measurements								
Standard length (in mm)	155.0	21	68.5–155		27	88–184		
Snout length	9.0	20	7.9–9.6	8.9 ±0.5	27	6.8–10.1	9.1 ±0.7	
Orbit length	9.0	21	8.4–9.9	9.2 ±0.4	27	7.2–10.2	8.8 ±0.8	ns
Infraorbital pore width	2.2	12	0.7–2.3	1.3 ±0.4	27	0.5–1.9	1.1 ±0.4	$P<0.01$
Head length	31.0	21	28.4–32.3	29.9 ±0.9	27	26.4–33.6	30.5 ±1.6	
Head depth	12.3	19	11.3–13.5	12.5 ±0.5	27	11.0–14.5	12.5 ±0.8	
Interorbital width	3.0	21	2.7–3.5	3.1 ±0.2	27	2.1–3.4	2.7 ±0.4	$P=0.05$
Pectoral-fin ray length	22.6	21	20.9–25.0	22.8 ±1.2	27	20.5–29.6	23.8 ±2.4	ns
Pelvic-fin ray length	13.6	20	12.6–17.7	15.0 ±1.4	27	11.0–16.0	13.0 ±1.6	ns
Caudal-peduncle depth	3.7	21	3.1–4.1	3.7 ±0.2	27	2.6–4.3	3.5 ±0.3	ns
Caudal-peduncle length	15.5	21	14.7–18.3	16.8 ±1.0	27	14.7–21.1	16.8 ±1.7	ns
Counts								
Dorsolateral scales	31	21	18–31	25.0 ±3.3	27	28–37	32.9 ±2.9	$P<0.001$
Dermal folds	99	21	67–99	81.6 ±8.2	27	50–87	64.6 ±11.3	$P<0.001$
Breast scale rows	10	21	4–10	7.2 ±1.6	27	4–11	7.8 ±1.8	ns
Lateral-line scales	48	21	47–50	48.2 ±0.8	27	47–50	48.8 ±0.9	$P=0.02$
Dorsal-fin spines	11	21	10–11	10.9 ±0.3	27	10–11	10.7 ±0.4	
Dorsal-fin rays	24	21	23–25	24.1 ±0.6	27	23–27	25.0 ±0.9	ns
Anal-fin rays	24	21	23–25	23.8 ±0.5	27	22–25	23.7 ±0.7	ns
Pectoral-fin rays	18	21	17–19	18.1 ±0.5	27	18–21	19.3 ±0.8	$P<0.001$
Gill rakers	11	21	7–12	9.3 ±1.3	27	5–9	7.1 ±0.9	$P<0.001$
Vertebrae	12+34	21	11–12+33–35		4	12–13+32–36		

Table 2

Counts of dorsolateral scales, dermal folds, and gill rakers on the first arch of *Triglops dorothy* n. sp. and *Triglops pingeli* from the Sea of Okhotsk.

	Dorsolateral scales																			
	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
T. dorothy	1	1		1	1	2	3	2	2	5		1	1							
T. pingeli											3	1	1	5	3	2		6	4	2

	Dermal folds																																			
	50	51	52	53	54	55	57	58	59	60	61	62	64	66	67	68	69	70	71	72	73	74	75	76	77	82	83	84	85	86	87	88	89	90	91	99
T. dorothy															1					2	1	2		1	2	1	2	1		2		1	1	1	2	1
T. pingeli	1	2	1	1	1	2	1	2			1	1	2	3	1				1			1	1		1		2		1							

	Gill rakers							
	5	6	7	8	9	10	11	12
T. dorothy			2	1	12	2	2	2
T. pingeli	1	5	13	7	1			

jaws, throat, ventral portion of cheeks, interopercle, extreme ventral tip of subopercle, and extreme dorsal margin of gill membrane naked; remaining part of head and dorsal half of body everywhere covered with rough, granular scales; approximately 10–16 close-set rows of tiny granular scales on anterior and dorsal periphery of eyeball, rows usually extending nearly to dorsalmost margin of eye. Oblique dermal folds terminating on caudal peduncle well before reaching ventral midline but sometimes crossing space between anus and base of anal fin. Dorsal-fin spines 10–11, anal-fin rays 23–25; vertebrae 45–47.

Color in preservation: dark brown dorsally, light brown, tan, to cream ventrally, with four dark saddles along dorsal length of body extending ventrally to, and sometimes slightly below, lateral line, anteriormost saddle situated beneath spinous dorsal fin, two beneath soft dorsal fin, posteriormost saddle on caudal peduncle; most specimens with a small saddle or narrow band of pigment crossing soft-dorsal fin at midlength (homologous to fifth saddle of many congeners). A series of dark, more-or-less equally spaced spots or streaks extending along length of body just ventral to lateral line, spots nearly always interconnected in males to form a conspicuous dark stripe across length of body, but not extending onto caudal-fin base. Anterior portion of lower lip darkly pigmented, sometimes interrupted at symphysis of jaw; upper lip with a dark streak across symphysis and two or three similar, more-or-less equally spaced streaks on each side, posteriormost streak contiguous with similar spot or streak on maxilla (pigmentation of lips more intense in males); males with a streak of pigment extending along dorsal margin of upper jaw from ventral margin of lacrimal to beneath and slightly past eye; a large, diffuse spot posterior to distal tip of maxilla (more heavily pigmented in males), sometimes forming an oblique streak extending from posterodorsal margin of maxilla posteroventrally to preopercle. Dorsomedial surface of opercle and posterodorsal margin of gill membrane densely covered with small melanophores, pigment extending ventrally along medial surface of branchiostegal rays (pigmentation often bleached away in old, poorly preserved material); lateral surface of distal portion of four or five posteriormost branchiostegal rays, as well as gill membrane in between, heavily peppered with small melanophores. Each spine and ray of dorsal fin (but not membrane in between) with two to four, dark, more-or-less equally spaced spots. Four to seven narrow, more-or-less equally spaced bands of dark pigment across dorsalmost or nonexerted rays of pectoral fin; a small, dark spot at dorsal insertion of pectoral fin often continuous with pigment extending ventrally to mid-base of fin. Anal fin usually unpigmented, but some specimens with rays darkly pigmented or lined with rows of melanophores, pigmentation especially intense in males; pelvic fins usually unpigmented, but some males with distal tips of first and second rays lightly pigmented. Base of caudal fin with dark dorsal and ventral spots, ventral spot usually more distinct than dorsal; males with a dark spot near distal end of dorsal and ventral lobes of caudal fin, sometimes faint and difficult to discern in preserved specimens.

Sexual dimorphism

Females with pectoral-fin rays slightly shorter (22.6–23.4% SL) than those of males (20.9–25.0% SL). Females with pelvic-fin rays slightly shorter (12.6–14.7% SL) than those of males (12.7–17.7% SL); tissue surrounding pelvic-fin spine and first ray expanded in males.

Statistical analyses

Univariate analyses of morphometric characters indicated that only interorbital width and the length of the first infraorbital pore exhibited significant differences between *T. dorothy* and *T. pingeli* (Table 1). The analyses of meristic characters, on the other hand, revealed significant differences in several characters, including fewer dorsolateral scales, lateral-line scales, and pectoral-fin rays, and a greater number of dermal folds and gill rakers in *T. dorothy* than in *T. pingeli* (Table 1). Three-way plots of dorsolateral scales, dermal folds, gill rakers, and pectoral-fin rays exhibit a clear separation between *T. pingeli* and *T. dorothy* (Fig. 2B).

In plots of scores from the PCA of meristic characters, two distinct clusters, one for each of the two species, were evident (Fig. 3A). The primary axis of separation was PC1 (30.2% of total variance), which was heavily loaded positively on dorsolateral scales and gill rakers and negatively on lateral-line scales; loadings along the PC2 axis (22.4% of total variance) were heavily loaded positively for breast-scale rows and negatively for anal-fin rays and dorsal-fin rays (Table 3). In contrast, broad overlap was displayed in the analysis of morphometric characters, with individuals of *T. dorothy* clustering among the larger group of *T. pingeli* from the Sea of Okhotsk (Fig. 3B). The first principle component (PC) was interpreted as a size component accounting for 95.5% of the total variance. In plots of the scores of the sheared second and third shape components (1.5% and 1.1% of total variance, respectively), the greatest dispersion was along the PC2 axis (Fig. 3B, C), and loadings along this axis were highest for interorbital width, snout length, and caudal-peduncle depth (Table 3). Loadings along the PC3 axis were highest for pectoral-fin ray length, ventral caudal-peduncle length, and orbit length (Table 3).

The single linear discriminant function equation produced was highly significant (χ^2=96.5, 6 df, P<0.0001):

$$D = 0.894(ds) - 0.691(g) + 0.530(p) - 0.508(df) - 0.284(io) + 0.098(ll),$$

where D = the discriminant score of an individual;
ds = number of dorsolateral scales;
g = number of gill rakers;

Table 3

Factor loadings for standard principal component (PC) analysis of meristic characters and sheared PC analysis of morphometric characters for *Triglops dorothy* n. sp. and for *T. pingeli* from the Sea of Okhotsk.

	PC1	PC2	PC3
Meristics			
Dorsal-fin rays	−0.3678	−0.4269	0.1352
Lateral-line scales	−0.3886	−0.1695	0.2437
Anal-fin rays	−0.2007	−0.5078	0.3611
Dermal folds	−0.4517	−0.0691	0.4440
Pectoral-fin rays	−0.3750	0.3030	0.3137
Dorsolateral scales	−0.3668	0.3919	0.2438
Breast scale rows	0.0861	0.4464	0.4980
Dorsal-fin spines	0.1918	0.1278	0.0765
Gill rakers	0.3875	−0.2560	0.4281
Morphometrics			
Standard length	0.3446	0.0348	0.0764
Snout length	0.3541	0.2603	−0.2662
Orbit length	0.3117	0.2043	−0.4521
Head length	0.3547	0.15793	−0.1867
Head depth	0.3340	0.0861	−0.2887
Interorbital width	0.2999	−0.7286	−0.0446
Pectoral-fin ray length	0.3431	0.2007	0.5844
Caudal-peduncle depth	0.3266	−0.5013	0.0598
Caudal-peduncle length	0.3271	0.1857	0.5036

p = number of pectoral-fin rays;
df = number of dermal folds;
io = interorbital width divided by SL; and
ll = number of lateral-line scales.

All individuals with negative scores had been previously identified as *T. dorothy*, whereas those with positive scores were *T. pingeli*. The discriminant function equation correctly classified all individuals, as did the cross-validation procedure.

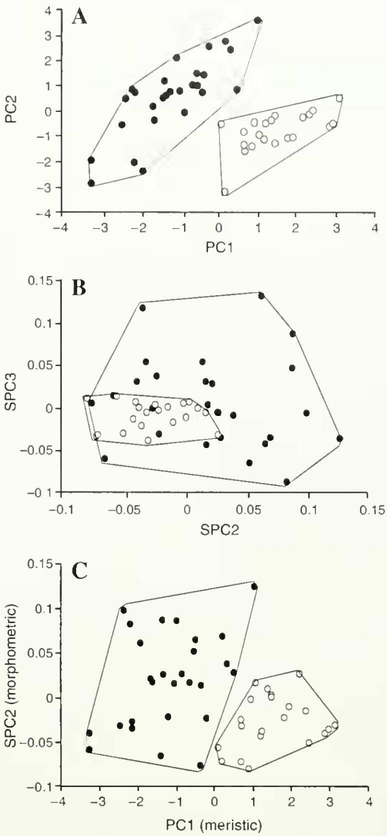

Figure 3

Plots of sheared principal component (SPC) and standard principal component (PC) scores for morphometric and meristic characters of *Triglops dorothy* n. sp. (•) and *T. pingeli* (○): (**A**) meristic characters only; (**B**) morphometric (SPC2 and SPC3) characters only; (**C**) morphometric (SPC2) and meristic characters (PC1).

Distribution and habitat

Triglops dorothy is known only from the southern Sea of Okhotsk: 19 specimens collected in or adjacent to Aniva Bay, at the southern end of Sakhalin Island, Russia; and two specimens from north of Kitami, Hokkaido (Fig. 4). The material was trawled off bottoms of mud, fine sand, rock, and clay, at depths of 73–117 m.

Etymology

The species is named in honor of Dorothy Thomlinson Gilbert, great granddaughter-in-law of the eminent ichthyologist and fisheries biologist Charles Henry Gilbert, for her generous and steadfast support to graduate students in ichthyology at the University of Washington, Seattle, in establishing the William W. and Dorothy T. Gilbert Ichthyology Research Fund. The specific epithet is to be treated as a noun in apposition.

Discussion

Credit for the discovery of *T. dorothy* is given to Charles Henry Gilbert (Pietsch, 1993; for biographical information on Gilbert, see Dunn, 1997), who, soon after the material was collected, recognized its uniqueness.

Although the USNM catalog ledger has "cotype" handwritten next to each catalog number (all 19 CAS-SU and USNM specimens are labeled as such) and Smithsonian Institution accession file no. 54484, dated 6 September 1912, lists the material as "co-types described by Dr. Gilbert" (Palmer[1]), a description was never published.

Why Gilbert, on closer inspection, chose not to formally recognize *T. dorothy* is probably because of its extreme similarity to *T. pingeli*. *Triglops dorothy* is easily confused with the latter species, but can be distinguished satisfactorily on the basis of only three meristic characters that overlap slightly between the two species in the Sea of Okhotsk (Tables 1–2): the number of oblique, scaled dermal folds below the lateral line (67–99 in *T. dorothy* versus 50–87 in *T. pingeli*), the number of dorsolateral scales (18–31 in *T. dorothy* versus 28–37 in *T. pingeli*), and the number of gill rakers (7–12 in *T. dorothy* versus 5–9 in *T. pingeli*). A significant difference in the length of the first infraorbital pore (Fig. 2A) reflects differences in the overall shape of the snout of the two species. In *T. dorothy*, the snout is slightly shorter and slightly more ventrally oriented than in *T. pingeli*.

Triglops dorothy is known only from the shallow continental shelf of the southern Sea of Okhotsk between Sakhalin Island and Hokkaido, an area that is thought to have served as a refugia for other species during the Quaternary glacial maximum (see Noll et al., 2001; Brykov et al., 2003). During this period, glaciers extended to just north of Terpeniya Bay on Sakhalin Island and to central Iturup Island in the southern Kurils, leaving the southern and central part of the Sea of Okhotsk ice-free. This region is thought to have been relatively isolated during this time from the Pacific Ocean and the Sea of Japan because of lower sea levels that connected the southern coastlines from Sakhalin to Hokkaido and the southern Kuril Islands (Kryvolutskaya, 1973; Pietsch et al., 2001; 2003). These land connections may have served to split and isolate populations of benthic marine fishes, such as *T. pingeli*, providing the opportunity for allopatric speciation of *T. dorothy*.

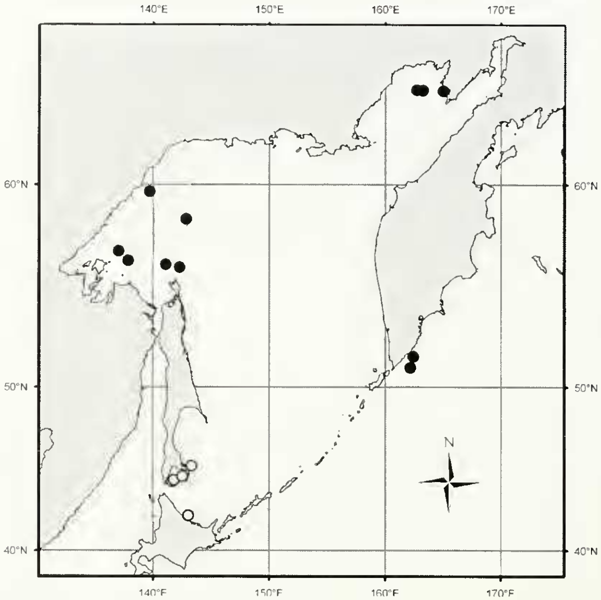

Figure 4

Distribution of *Triglops dorothy* n. sp. (○) and *T. pingeli* (●) in the Sea of Okhotsk based on material examined. Each symbol may represent more than one capture.

Acknowledgments

We thank the many people who made material available, especially W. N. Eschmeyer, T. Iwamoto, and D. Catania (CAS); S. L. Jewett, L. F. Palmer, and J. T. Williams (USNM); and M. Yabe (HUMZ). K. P. Maslenikov (UW) provided curatorial assistance. We are grateful also to two anonymous reviewers who greatly improved the final draft of the paper. A presubmission draft was critically read by J. R. Dunn (UW) and D. E. Stevenson (Alaska Fisheries Science Center, Seattle). The work was supported by the National Science Foundation under contract number DPP74-13988 to the Smithsonian Institution, F. D. Ferrari, principal investigator.

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Appendix—Comparative material examined

Triglops pingeli: HUMZ 54593 (female, 164 mm), HUMZ 54594 (female, 180 mm), HUMZ 54674 (male, 158 mm), HUMZ 55266 (female, 184 mm), HUMZ 55267 (female, 165 mm), HUMZ 55268 (female, 176 mm), West Kamchatka, 59°00′N, 168°00′E, 80 m, 5 June 1976; HUMZ 55052 (female, 170 mm), HUMZ 55055 (female, 171 mm), HUMZ 55058 (female, 167 mm), HUMZ 55062 (male, 154 mm), HUMZ 55089 (male, 150 mm), East Kamchatka, 51°25′N, 158°04′E, 135–140 m, 21 May 1976; HUMZ 55154 (female, 140 mm), Penjinskii Bay, 59°59′N, 160°00′E, 112–113 m, 6 June 1976; HUMZ 56400 (female, 104 mm), East Kamchatka, 50°58′N, 157°52′E, 242–245 m, 22 May 1976; HUMZ 56466 (female, 127 mm), Gizhiga, 61°01′N, 158°17′E, 94–95 m, 7 June 1976; HUMZ 57984 (female, 120 mm), Sea of Okhotsk, 56°40′N, 143°22′E, 310 m, 22 September 1976; HUMZ 58051 (male, 114 mm), HUMZ 60855 (female, 119 mm), Sea of Okhotsk, 55°30′N, 139°00′E, 117 m, 7 September 1976; HUMZ 60702 (male, 123 mm), Sea of Okhotsk, 57°38′N, 141°00′E, 121 m, 14 October 1976; HUMZ 60799 (female, 121 mm), Sea of Okhotsk, 57°38′N, 141°00′E, 121 m, 14 October 1976; HUMZ 60808 (female, 140 mm), HUMZ 60810 (female, 126 mm), HUMZ 60811 (female, 124 mm), Sea of Okhotsk, 54°54′N, 142°57′E, 110 m, 6 September 1976; HUMZ 60919 (female, 88 mm), Gizhiga, 61°00′N, 158°41′E, 88–90 m, 7 June 1976; HUMZ 60941 (female, 125 mm), HUMZ 60952 (female, 125 mm), Sea of Okhotsk, 55°00′N, 142°02′E, 121 m, 6 September 1976; HUMZ 61063 (male, 120 mm), HUMZ 61068 (female, 128 mm), Sea of Okhotsk, 55°09′N, 139°38′E, 124 m, 7 September 1976.